Mosquito News

Vol. 3, No. 1 MARCH, 1943

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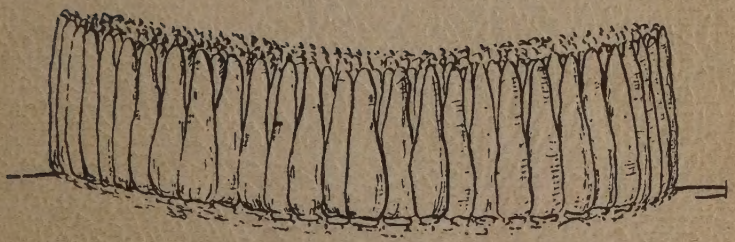

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L. O. HOWARD

Leland Ossian Howard, B.S., M.S., Ph.D., M.D., LL.D., Sc.D., was born in Rockford, Illinois in 1857. He served the Federal Government as Assistant Entomologist from 1878-94, as Chief, Bureau of Entomology, 1894-1937, and as Principal Entomologist, U. S. Department of Agriculture, 1927-31. He was retired in 1931.

Dr. Howard's career has covered world-wide service in insect research and control. He has maintained scientific relations with the principal entomologists and entomological societies of the world. He served for many years as permanent secretary of the American Association for the Advancement of Science.

Interest in mosquito work occupied much of his attention and he has written the following books:

"Mosquitoes, How They Live, How They Carry Disease, How They Are Classified, How They May Be Destroyed"

"The Insect Book".

"A Monograph of the Mosquitoes of North and Central America and the West Indies".

"History of Applied Entomology".

"The Insect Menace".

"Fighting the Insects—The Story of an Entomologist".

It appears that this book writing has been an extra labor of love for he is the author of a vast number of Federal bulletins, circulars, etc.

More Significant to us than this enormous production of scientific information is the personality of the man. He is in every respect a fine gentleman, a very inspiring teacher, and a sincere and warm-hearted friend. At the age of 86, he now resides in New York City.

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Thomas D. Mulhern, Secretary-Treasurer
Eastern Ass'n. of Mosquito Control Workers
New Brunswick, New Jersey

EDITORIAL COMMENT

A national organization for mosquito control workers is being suggested from several sources, primarily for exchange of ideas through some medium such as "Mosquito News". Two plans have been proposed as follows:

1. The Eastern Association of Mosquito Control Workers should expand to a national basis (it already has members from coast to coast) and change its name to The National Association of Mosquito Control Workers or a similar suitable name.

2. A National Association should be formed by affiliation of present sectional groups. Each of whom would have a member on the governing board and be autonomous.

The purpose of such proposals is to bring the benefits of "Mosquito News" to more of the workers in this field. The present readers feel that it fills a long-standing need among their ranks and that many other mosquito control workers should have the benefits of the magazine. The publication can be greatly improved by having a wider range of subscribers to furnish material. More talent for publishing would be available to prepare the reading matter. A better job of publishing could be done, such as, printing with illustrations instead of the present mimeographing process. More advertisers would be attracted through the wider distribution that would follow nationalization.

These objectives are well worth-while and should be promoted as rapidly as possible. Mosquito control is vital to winning the war and well-informed workers are the best workers. "Mosquito News" collects all the latest developments that its contributors discover and places these findings before its readers promptly. If these findings could be in the hands of every mosquito control worker as quickly, it might mean the prevention of

a malaria epidemic or a work slow-down, or the finding of a great new discovery vital to our war effort.

NOTICE

The Association of Economic Entomologists has a committee on Military Entomology, consisting of F. C. Bishopp, Chairman, Robert Matheson and myself, and they have available a questionnaire to be filled out by those who wish to get into the Sanitary Corps of the Army or the Medical Corps of the Navy. Blanks may be secured from this office.

Both services are particularly interested in men who have had actual experience in mosquito control, and I am sure that they would welcome knowledge of suitable men.

Ernest N. Cory
State Entomologist
University of Maryland
College Park, Maryland

NOTICE

Your attention is directed to the Suppliers Directory at the end of this issue which will help in obtaining this year's supplies. The Committee plans for later issues the following Directories:

Mosquito Control Agencies	June
Mosquito Control Executives	September
Mosquito Control Books & Pamphlets	December

The Editor

EASTERN ASSOCIATION OF MOSQUITO CONTROL WORKERS

The election of officers for 1943 has been completed with the following officers being elected:

President	Robert C. Botsford, New Haven, Conn.
1st Vice-President	Robert L. Vannote, Morris Plains, N.J.
2nd Vice-President	Dr. Robert D. Glasgow, Albany, N. Y.
Secretary-Treasurer	Thomas D. Mulhern, New Brunswick, N.J.

The Membership of the Executive Committeehas also been elected by mail and is as follows:

Massachusetts	Edward Wright
Rhode Island	Milton Price
Connecticut	Robert C. Botsford
New York	Edward Butchard
New Jersey	Lester Smith
Pennsylvania	J. F. Conner
Delaware	E. E. Lynch
Maryland	Dr. E. N. Cory
Virginia	R. E. Dorer
U. S. Government	Dr. F. C. Bishopp

Certain recommendations for the Committee on Publication of "Mosquito News" and also recommendations pertaining to dues and membership have been adopted by the Association since our last issue and are essentially as follows:

1. That Mosquito News be gradually modified in the manner calculated to make it best serve as a journal of general interest to mosquito workers.

2. That a large sample edition be issued as the first 1943 number, with enough free sample copies being sent out to bring up the guaranteed circulation to 500 copies. This large distribution should be used as an inducement to advertisers, and an appeal for membership should be made a part of the book. The issue should

embody, as far as possible, the improvements suggested to the Publications Committee, and should include a directory section, giving sources of supplies needed in mosquito work. It should also carry leading articles of general interest, reviews of literature and personal notes.

3. To more equitably distribute the costs, and to make Mosquito News self-supporting, subscription rates and dues should be modified, as follows:

Dues, active members, $4.00, including Mosquito News, all pamphlets, and notices issued by the Association. Active members only may hold office, and vote.

Dues, associate members, $2.50, including Mosquito News, all pamphlets and notices issued by the Association.

Institutional subscriptions, $3.00, including special institutional membership, Mosquito News, and all pamphlets and notices issued by the Association. This classification is intended to cover libraries and other institutions.

Sale of individual copies of Mosquito News, $.75 each.

If the present situation with regard to transportation does not materially improve, it is likely that there will be fewer meetings of the group in 1943 than in 1942, and in any event, membership is now spread over so large an area that much of the activity of the Association must be by mail to give serious thought to the contributions we may make toward more or better mosquito control.

There will probably be an informal get-together of those who attend the Annual Meeting of the New Jersey Mosquito Extermination Association at Absecon, New Jersey on March 10, 11 and 12 sometime during the meetings of the association.

Thomas D. Mulhern
Secretary-Treasurer

WORLD WIDE MOSQUITO CONTROL

Pacific Coast Anti-Mosquito Conference Cancelled

The annual conference of the Pacific Coast Mosquito Abatement Districts has been cancelled because of the war effort restricting the members time and transportation. One paper by Mr. G. W. Mapes, originally prepared for this conference, has been offered to Mosquito News for publication and appears in this issue under New Developments in Mosquito Control.

The 1942 Anti Mosquito Campaign in Bermuda

Dr. Henry Wilkinson,
Senior Medical Officer
Medical & Health Dept.
Hamilton, Bermuda

In the autumn of 1941 a sharp epidemic of dengue attacked 1,401 people of this island, according to the records of the Health Department, and probably as many more whose illness was not recorded. It seemed but a sensible procedure and a war time precaution to see that such a catastrophe should not recur, especially as the mosquito Aedes aegypti, which spreads dengue, can transmit yellow fever with equal facility, once the seed is planted. So it was agreed that all available forces should be joined in an effort to clear this mosquito; and, as she is indistinguishable from others to most eyes and on most occasions, all mosquitoes should be fought. Some of the others if not of primary importance in human health are no less of a nuisance and probably are significant in veterinary medicine.

So for six months this year the U. S. Army and Navy joined a squad of the British Garrison in helping the

Health Department to inspect the island and fight the domestic mosquitoes. The force consisted of thirty American and twenty British men. The U. S. Army in addition supplied the services of Mr. Jason Berry, a sanitary engineer, to help in the campaign.

The island was divided into fifty parts and an individual map issued for each part. The territory was then covered by the temporary inspectors. Tanks and gravity tanks were inspected and screened or supplied with fish, abandoned tanks punctured, rock cisterns filled or punctured, gutters straightened, needless receptacles and trash cleared, water containing plants uprooted, and much undergrowth cut away. At the same time appropriate leaflets were issued to all the school children, and the Bermuda General Theatres Limited most generously loaned the use of its halls and equipment in Hamilton, St. Georges, Hamilton Parish, Southampton and Somerset so that a mosquito film could be shown to the entire school population. Thus the campaign with its purpose was brought to the attention of every man, woman and child of school age.

Throughout the six months the chief officers immediately concerned in the campaign met weekly to review the work, and the press issued statements of their deliberations. Without the generous cooperation of these officers and men of the armed forces of the two nations, and also of the press, it would have been impossible to make the substantial progress against mosquitoes which was achieved. The measure of that progress was indicated by a trap near the Electric Light Station which bagged five mosquitoes during three nights in October against seventy-four over the same period in May. Other traps gave much the same results. The traps were in the hands of Mr. John Travis, who has worked on mosquitoes in the United States for thirty years and whose services were loaned by the New Jersey Mosquito Commission for the campaign. Mr. Travis not only gave practical expert advice throughout, but proved an excellent coordinator and never failed to clear those little differences which invariably arise between

one group of workers and another. The people of Bermuda have good reason to extend their gratitude to the U. S. forces, the British Garrison and Mr. Travis for the work accomplished.

The Dockyard joined in the campaign. Then the work had to be carried to the islands in the Great Sound, Hamilton Harbour and St. Georges Harbour, and the boats moored in those waters. For these periodic inspections carried on from Hamilton many thanks are due to Mr. Sydney Spurling who not only took the inspectors in his motor boat without charge, but on several days gave them the benefit of his own intimate knowledge.

Another job was the clearance of red hot poker plants which hold usually a gill of water and furnish an admirable breeding place for mosquitoes. At the beginning the clearance of these plants was considered an incidental matter, but their numbers have run to about 20,000 without the end being reached.

But inspecting and clearing domestic mosquitoes was not the only object of the campaign, for the marsh mosquitoes remained, and much manual spade work has had to be carried on beyond the public gaze against them. The first job was to sink 700 yards of trench in the swamp at Southampton West. No contractor could be found to undertake it at less than 4/-a cubic yard, so the Health Department assumed the work. Inspector Wright became foreman and put through the initial job at 2/2d a yard. Thenceforth he superintended most of the trenching and also the clearing of old drainage trenches. The figures run to some length; in Warwick 120 yards of trench were dug and 1,770 cleared; in Paget 1,285 dug and 1,130 cleared, in Devonshire 3,900 dug and 2,125 cleared, in Pembroke 725 dug and the canal cleaned for a mile and a half, 150 yards of subsidiary trench cleared and another 150 yards of trench, no longer effective, filled; in Hamilton Parish 320 yards

of trench were dug and 400 cleared; in Somerset 250 yards cleared. Thus in round numbers 7,250 cubic yards of trench were cut and the same amount cleared, if the Pembroke canal is not counted. No separate account was kept between the digging and clearing, for the work went on concurrently, but in general a yard was dug and another cleared for 2/3d, and at the present time there are 8¼ miles of trench in working order. In addition 2,000 square yards of Southampton Pond were cleared.

Incidentally it is of interest to note the number of mosquitoes trapped. Aedes aegypti 260, Culex fatigans 220, Aedes sollicitans 73 and Aedes taeniorhynchus 249, the first two being the domestic and the last two salt marsh varieties.

During these six months numerous talks on mosquito control were given to clubs and small groups and a 16mm film was shown. In furtherance of this idea Messrs. Travis and Berry devised, and Mr. Knudsen photographed a 16mm technicolor film which will be ready for general use in the New Year. It is both informative and beautiful and should be popular.

Though much has been done a good deal remains. The marshes extending disjointedly from Paget East into Smiths have to be trenched and the edges of ponds straightened. During the cool months the U. S. forces are inspecting St. Georges Parish, Tucker's Town, part of Smiths and all of Southampton. The remainder of the island is being covered by a maintenance squad of eight men working from the Health Office. They are doing more than maintenance work and have made several definite advances. In the spring, however, it will again be necessary to cover the island several times in rapid inspection, and the General of the U. S. Army has generously promised to augment the mosquito squad for several weeks to enable the mosquito control to be put on the most favorable basis. The residents are cooperating and if they will but keep up their interest the mosquitoes should be sufficiently reduced by midsummer to be under permanent control.

ACTIVITIES IN MEMBER STATES

New Jersey Convention Moves

Plans for the 1943 Annual Meeting of the New Jersey Mosquito Extermination Association reveal that the meeting has left Atlantic City for the first time since the organization of the Association in 1914. The meeting is to be held in nearby Absecon at the Seaview Golf Club on March 10, 11, 12, 1943. Timely and interesting discussions are planned with the main theme "Control of Malaria in War Time and War Areas".

Mosquito Control in Rhode Island For the Year 1942

Milton H. Price,
Mosq. Control Supervisor

A law for the suppression or eradication of pest mosquitoes was passed in 1934. This law provides for a State Mosquito Control Supervisor whose task it is, at the request of a harassed city or town, to draw up plans for its relief. If the local authority accepts the plans, it is obligated to furnish equipment and materials for carrying them out. It is likewise obligated to maintain the work when completed. Federal Relief Agencies in the past have provided the necessary labor for construction.

These facts should be kept clearly in mind when reviewing a year during which no mosquito project was sponsored by city or town, and when relief labor was quickly being absorbed by the war effort.

Certainly the year 1942 started off suspiciously for mosquito control. The Public Health Service was responsible. At its request, a project was drawn up which called for the expenditure of $300,000 of Federal Funds to eliminate mosquito breeding places adjacent to defense

areas. Malarial mosquitoes are known to exist throughout the season in Washington County. Since we have in our midst a large influx of service men and defense workers from malaria districts of the South, the Federal Officers sought to eliminate all possibility of an epidemic.

The Federal Funds were available, however, only if some local of State authority were to guarantee maintenance of the finished project. No local authority would accept the responsibility because the proposed work did not directly benefit residential areas. And the State Legislature rejected a bill, sponsored jointly by the Department of Agriculture and the Department of Health, which would have provided funds to maintain not only the new project, but also $2,250,000 worth of old projects.

When the State bill failed to pass, the Federal officers withdrew their offer; and, except for providing two men for control work inside military establishments, they have dropped the matter of protecting defense areas.

A small force of W. P. A. labor worked for the greater part of the year in the vicinity of Fort Nathanial Greene. The salt marsh at Point Judith was ditched and some of the fresh water breeding areas corrected. As a result, much less mosquito annoyance was noted in this area during the past summer.

W. P. A. also furnished the State with two mosquito inspectors during the breeding season. These men worked in areas near military establishments, charting breeding places in North Kingstown and Narragansett. Similar data has been gathered during the past four years from other areas of the state in order that this Office may know where pest mosquitoes originate; and breeding area maps have been made available to local authorities.

The wet summer, coupled with failure of most cities and towns to honor their agreement to keep mosquito ditches open, caused excessive mosquito breeding--much to the annoyance of both civilians and our armed forces. Complaint

were received from all parts of the state. Since October 5, because relief labor is lacking to do mosquito control work, the State Mosquito Control Supervisor has been assigned to patrol duty with the State Office of Fish and Game. But before he left, he placed maps, showing where construction work should be maintained, in the hands of the proper authority in each town and city.

Nassau County (North Shore), Long Island
Watching Quads and Gasoline

Edward Butchard, Superintendent
(North Shore) Nassau County
Long Island

In my district in Nassau County we did not have any cases of malaria, but the Anopheles quadrimaculatus breeding was one percent higher in 1942 than in previous years, due to the heavy rainfalls during the season. Our efforts were concentrated mostly on this particular type of breeding this year, due to the fact that we have quite a number of Defense Plants and a large Army Air Field in and around these breeding areas.

We also reduced the mileage of trucks 4,139 miles; a saving of 672 gals. of gasoline.

No yard inspections were made during the rainy period, and also the catch-basin spraying was abandoned, as we had to use the Inspectors for the field work. This served to reduce the mileage and gas problem.

Mosquito Control in Delaware 1942

By - E. E. Lynch
and
Paul L. Rice

The Delaware Legislature at its last session made available to the State Highway Department the sum of

$33,250 for mosquito control work, for each year of the present biennium.

Breeding was unusually heavy during late July and early August. Many things accounted for this such as very wet unfavorable weather, the shortage of labor, and lack of ditch maintenance. During the summer period our crews located 5,821 breeding places totaling approximately 31,616,434 square feet. It required 24,676 gallons of diluted larvicide to treat 3,756 breeding places. Due to unfavorable conditions and labor shortage, many areas were not inspected during the season. Cleaning and ditching totaled 604,490 linear feet.

The Gordon Lake region was considerably improved by the work of the Department and showed quite a reduction in breeding. During the 1941 season a total of 32,694,772 square feet of breeding was found in the area. Even though the summer of 1942 was more favorable for mosquitoes, a total of only 915,910 square feet of breeding was located. Conditions were so much improved that scarcely any spraying was required.

In addition to regular maintenance operations, the Highway Department supervised a $36,095.00 WPA project for mosquito control work inside and near two military reservations in Sussex County. This work was active through most of the year. In connection with the project 592,958 linear feet of new and old ditch was cleaned, twelve construction projects totaling $6,078.84 were completed and other phases of work pertaining directly to control work were carried out. The results of this activity were favorable for mosquito reduction at the points where the work was done, but the surrounding unmaintained areas accounted for considerable mosquito annoyance. An additional sum of $52,095 was requested to complete some work near the Fort Miles boundary but this was not approved previous to the abandonment of the WPA work in December. It is hoped that some other agency may finance the continuation of this work near the military posts.

A second W. P. A. project in mosquito control was active in the vicinity of Fort du Pont in New Castle County from May, 1941 until June 30, 1942, at which time the work allotment was cut off. The original project called for an expenditure of $62,693.00 of which about $42,000.00 was used previous to the time the work was discontinued. Approximately 40 per cent of the control work needed within a radius of five miles from the Fort was completed under this project. The work had consisted mainly of ditching, tide gate installations, and clearing of brush.

Two large marshes near Fort du Pont, which are heavy breeders of Anopheles, are as yet untouched. These two areas, Dragon Run and St. Georges Basin, must be controlled before there will be a marked reduction in mosquito populations at the Fort.

The Department of Entomology of the Delaware Agricultural Experiment Station has assisted in the above control projects by furnishing the technical supervision on certain phases of the work. Data on the prevalence in the State of the various species of mosquitoes have been accumulated through the operation of fourteen mosquito traps located at various points.

DEVELOPMENTS IN MOSQUITO CONTROL

A New Oil-Emulsion Mosquito Larvicide

By - E. F. Knipling, C. M. Gjullin
and W. W. Yates
U. S. Dept. of Agriculture
Agricultural Research Adm.
Bureau of Entomology and
Plant Quarantine

The Bureau of Entomology and Plant Quarantine has found that an effective mosquito larvicide may be made by using certain emulsifiers and thus reducing the amount of oil required to about 6 gallons per acre. This

is news which the oil-administration and mosquito-control agencies will welcome enthusiastically.

Among 26 emulsifiers tested only 3 were found particularly effective. All three of these are materials which are sold under trade designations and for which there is no adequate chemical description. The results reported are based on the particular samples received and assurance cannot be given that there will not be considerable variation between lots.

The emulsion is made with 96 parts of diesel oil or fuel oil No. 2 and 4 parts of a sulfated sperm oil (Nopco 1216), a phthalic glyceryl alkyd resin (B-1956), or an 18-carbon-chain complex amine (Amine 230X) as an emulsifier. This stock emulsion is diluted with 5 or 6 parts of water (7 parts of water when Amine 230X is the wetting agent) and applied at the rate of 30 to 40 gals. per acre of water surface. Satisfactory kills have been reported when this emulsion has been used in fresh water, but it is less effective in salt water.

A mosquito control agency in the Pacific Northwest, where floodwater mosquitoes are involved, found that an application of 40 gallons of the diluted emulsion per acre, costing 80 cents, was as effective as the same quantity of oil, costing $2.40, which had previously been used. The cost of the emulsion included 36 cents for 6 gallons of oil and 44 cents for 1 quart of wetting agent.

The emulsifiers mentioned above may be obtained as follows:

Nopco 1216, from National Oil Products Co., Harrison, New Jersey.
B-1956, from Rohm and Haas Co., Philadelphia, Pa.
Amine 230X, from Carbide and Carbon Chemicals Corp., New York City.

Further research may disclose other emulsifiers satisfactory for this purpose.

Additional details can be obtained by writing the Bureau of Entomology and Plant Quarantine, Washington, D.C.

PRELIMINARY PROGRESS REPORT
Do Male Mosquitoes Fly as Far as Females? Is the Flight Range of all Mosquitoes the Same?

J. Lyell Clarke, Sn. Eng.
Desplaines Valley Mosq.
Abatement District
Lyons, Ill.

For 25 years I have been under the impression that male mosquitoes remain near their breeding places. Often it has been observed that mosquitoes swarm and mate at marshes and that the males remain near the breeding places. It is a sort of rule of thumb among mosquito workers, to look for males as an indicator to nearby breeding. In my experience I have thought that this observation has worked very satisfactorily. In sleuthing for hidden breeding places of Anopheles and Culex I have been under the impression, many times, that I have been rewarded. In tracing the source of Aedes vexans in villages I am guilty of having instructed our inspectors to look for male mosquitoes in order to determine whether or not vexans annoyance originated in nearby wet lots rather than from long distance flights. I have never found in literature any proof that the female of the species flies farther than the male.

With these thoughts in mind an opportunity presented itself during the past summer to prove or disprove this rule of thumb. There was a large marsh perhaps 40 acres in extent which had been flooded, the flood waters had receded leaving concentrated pools of perhaps 12 acres teeming with mosquito larvae. The rains had not been sufficient to cause vexans breeding generally only several large marshes within flight range of the district would produce large broods. From these marshes to the west and south of the District I expected only a mild annoyance

from flight. Having on hand already mixed a sufficient quantity of aniline dye I decided to dust this area and trace the flight of both male and female mosquitoes. This was done by carefully observing the progress of the larvae in order to apply stain to both males and females. As soon as the males began to emerge the marsh was dusted with brown aniline dye, the next day with red aniline dye, the third day with violet, the fourth day with yellow. In this way the entire brood was stained. Following the dusting, mosquitoes were caught in 12 New Jersey light traps stationed at varying distances from 1 to 14 miles away. Catches were made over a period of 52 days, during the first 17 days catches were made each night, thereafter twice each week. The total number of mosquitoes in the traps was 23,000. To date 12,000 mosquitoes have been examined yielding 72 stained mosquitoes, a ratio of 1 stained mosquito to 166 unstained.

I might digress here a moment to state that, in the staining experiments carried out in this District in 1936, the method of catching was entirely different. In the 1936 experiment, after staining the mosquitoes in the marshes, they were recovered by hand-catching using a test tube with ether soaked cotton. Four men in four trucks caught during the day over a period of 39 days. In this experiment only day-biters were captured and only females; whereas in the experiment of 1942 the New Jersey traps yielded all species including the non-biters as well as females and males in which I was particularly interested.

The New Jersey traps caught a total of 23,000 mosquitoes, one-half of which have been examined to date. These consisted of 4378 males and 7629 females. Each of these mosquitoes was dipped in an aniline dye solvent under a low power microscope. Seventy-two specimens were found to be stained, 32 males and 40 females.

TABLE I
COMPARISON OF FLIGHT RANGE OF MALE AND FEMALE MOSQUITOES

Distance in miles from Marsh	Number and species of stained mosquitoes recovered												Total
	Aedes vexans		Culex pipiens		Culiseta inornatus		Anopheles punctipennis		Anopheles quadrimaculatus				
	F	M	F	M	F	M	F	M	F	M			
1	3	1	3	1	1								9
1½	1												1
2½													0
5	1												1
5½	1												1
6		1		2									3
8	3	3											6
8		7		4			1		1				13
9½	2		2	2									6
10½	3												3
10½							1						1
14	6	9	10	2	1								28
Totals	20	21	15	11	2	0	2	0	1	0			72

Referring to Table I it will be noted that the males of Aedes vexans and Culex pipiens fly as far as the females. Insufficient numbers of Culiseta inornatus, Anopheles punctipennis and Anopheles quadrimaculatus were recovered to compare the relative flight range of males and females.

Is the Flight Range of all Mosquitoes the Same?

Fortunately during this experiment there were six species of mosquitoes emerging at the time the marsh was dusted, Aedes vexans and Culex pipiens constituted the larger numbers. However there were present in lesser num-

bers Culiseta inornatus, Anopheles punctipennis, Anopheles quadrimaculatus and Psorophora ciliata.

The table given below shows the average distances and the maximum distances flown by stained specimens of each of these species except Psorophora ciliata.

TABLE II

AVERAGE AND MAXIMUM FLIGHT RANGE OF SEVERAL SPECIES OF MOSQUITOES ON THE 1ST DAY AND SUBSEQUENT DAYS AFTER APPLICATION OF EACH COLOR AT BREEDING GROUNDS

ay	Aedes vexans			Culex pipiens			Culiseta inornatus			Anopheles punctipennis			Anopheles quadrimaculatus		
	No.	Ave. Dist.	Max. Dist.	No.	Ave. Dist.	Max. Dist.	No.	Ave. Dist.	Max. Dist.	No.	Ave. Dist.	Max. Dist.	No.	Ave. Dist.	Ma
1st	8	5.5	14	2	7.7	9.5									
2nd	2	9	10	1	9.5	9.5							1	8	
3rd	7	13.4	14	1	14	14									
4th	9	12.4	14	5	14	14									
5th				3	99	9.5	1	14	14						
6th				3	66.3	9.5	1	1	1						
7th	9	8.6	14	6	6.8	8				2	9	10.5			
8th	1	1.5	1.5												
9th	2	3.1	5.25	1	1	1									
0th	1	14	14	1	6	6									
1th															
2th				4	14	14									
3th															
4th				1	14	14									

It will be noted in Table II that on the first day after application of each color the maximum distance flown by Aedes vexans was 14 miles and that the maximum distance flown by Culex pipiens during the first day was 9½ miles. These distances were flown, in from 4 to 16 hours, as the dusting of the marshes was stopped at about 3 P.M. The traps were timed to go on at 7 P.M. and go off at 7 A.M.

The question has arisen whether or not the distances shown in the tables are covered in a single initial flight or by progressive flights. There are instances in the table showing that the maximum flight was made in less than 16 hours. However the column showing average distances would indicate that for the first three days both vexans and pipiens reached the point of capture by progressive flights.

Table II shows that one of the two Culiseta inornata reached a maximum distance of 14 miles, that two Anopheles punctipennis averaged nine miles reaching a maximum distance of 10½ miles and that one Anopheles quadrimaculatus reached a maximum distance of 8 miles on the second day after staining. The longest recorded distance flown by Anopheles quadrimaculatus heretofore, 2.7 miles, was reported by Darling, 1925. Psorophora ciliata were quite numerous and annoying at the marsh, however no stained specimens have been recovered to date.

Summarizing the date in Table I it is noted that a striking correlation exists between the flight range of Culex pipiens and Aedes vexans. In fact, so far, evidence in Table I shows that the flight range of all five species might be the same.

Percentage of Stained Mosquitoes Recovered

Species	1-5 mile zone	5-10 mile zone	10-15 mile zone
Aedes vexans	17%	42%	41%
Culex pipiens	15%	39%	46%

The remaining one-half of mosquitoes taken in the New Jersey traps will be examined for color within the next two months.

Incidentally in the staining experiment of 1936 one Aedes dorsalis was found at a distance of seven miles from the point of staining. In a collection of mosquitoes taken at the marsh while staining operations were in progress considerable specimens of dorsalis were identified. However they constituted only a small percentage of the mosquitoes emerging, most of which were Aedes vexans.

Light Portable Gasoline Hammer

John P. Peterson, Supt.
Bergen County Mosq. Exter. Comm.
Hackensack, New Jersey

The need of a small, compact portable pile driver for use in constructing tide gates for mosquito control has long been recognized by mosquito control engineers.

During the construction of a large gate by this commission last winter, several types of the Drop Hammer Driver were considered, but due to war conditions it was almost impossible to rent, borrow or buy such equipment.

In planning our schedule of operation we ran across a light machine that seemed to have just what we wanted, plus. This unit known as the Barco Portable Gasoline Hammer was purchased and used on the job from Nov. 1941, to Feb. 1942, doing several kinds of work that we had not planned for in addition to driven 3" X 10" planks thru 36" to 48" of clay, we used it to tamper the clay fill between the sluice boxes and to pack solid clay under the

floor of the spill ways and boxes. We also found it of great help in cutting thru the frozen ground in preparing our coffer dams.

In keeping a straight line ahead of our power shovel, on canal work, this unit was found to be very practical.

During the past summer, while installing ditches we used a sharp blade for cutting cedar stumps and roots under water.

Some 10 or 12 tools come with the standard machine and many others can be made by the local Blacksmith, we have in mind a tooth edged blade that will cut tough sods, replacing the old hand saw method.

Description of the type of hammer used in Bergen County is as follows:

The Hammer is a single acting two cycle engine with free running piston which is propelled downward by explosion of the gasoline charge in the combustion chamber and returned by spring action. The piston acts as the hammer, striking an anvil which transmits the blow to the tool. The piston is always at the upper end of the cylinder when idle and the Hammer is started by pushing down on the starting plunger on top of the cylinder. The suction caused by the up-stroke admits air and gasoline through the mixing valve into the chamber below the piston. A second down-push of the starting plunger compresses the gas and the compressed gas passes through holes in the piston and through the by-pass into the upper combustion chamber. A cam on the piston operates the circuit breaker, for igniting the gas at the proper time and the two cycle principle is repeated with operation of the Hammer. Many of the details of construction and operation are shown in the instruction book furnished with the Hammer.

The Barco Portable Gasoline Hammer is an air cooled, two cycle, single cylinder, hard hitting, gasoline

driven hammer, ruggedly built to withstand the most severe service. It operates efficiently in any season of the year and at any altitude.

All models use low test or "regular" gasoline and lubrication is obtained by mixing oil with the gasoline. The normal fuel consumption of the model H-6 is one quart of this mixture per hour of operation. Smaller models use somewhat less. The gasoline tank attached to the Hammer has a capacity of two quarts, or sufficient for at least two hours of continuous operation. Electrical energy is supplied from a coil and battery and a storage battery is recommended wherever recharging facilities are available.

Standard 6 volt storage batteries are used, preferably of not less than 110 ampere hour rating, at the 20 hour rate. When circumstances require it, a 9 volt dry battery may be substituted.

Regular equipment for all models include a battery carry frame, coil container and coil, and 25 feet of cable from hammer to battery. The battery is not included unless specifically requested.

Weight, hammer only, with gas and oil Model H-6, 96 lbs.

Speed, strokes per min. 1100-1500

Batteries used 110 ampere hour 6 volt wet battery or a 9 volt dry battery.

A Method of Abating Salt Marsh Mosquitoes

Gordon W. Mapes, Supt.
Matadero Mosq. Abatement Dist.
Palo Alto, California

The general principles behind effective mosquito abatement are few; yet their adaptations under varying conditions are many. Thus, perhaps, the main principle underlying a thorough control of the Aedes salt marsh mosquitoes is effective drainage, which is an engineering

problem. This probably is the prime consideration in mosquito abatement areas bordering on tidal lands.

This principle, in conjunction with a knowledge of entomology, can be employed in a novel way to abate the marsh species of mosquitoes, as has been demonstrated in the marsh lands of Solano County, California through the practice of re-flooding large marsh areas during the breeding or hatching, then draining off these flooded areas when the larvae have reached the pupae stage.(1) Effective engineering work through developed drainage facilities makes it possible to destroy that portion of the mosquito eggs or "seed" that has hatched into larvae during the flooding operation--by quickly draining them into tidal waters. In this manner mosquito breeding on large areas of salt marshes can be practically eliminated without the transportation and distribution of large quantities of mosquito oil over marsh mud, which often presents formidable difficulties.

The Matadero Mosquito Abatement District in Santa Clara County, California has developed, in 1934 and succeeding years, a phase of abatement of the salt marsh types of mosquitoes that is similar to the method used in Solano County, excepting that once the larvae have developed in the flooded field, they are killed by oiling and the water is drained off.

A further similarity of the two methods is found through the hatching of the "seed" over a dyked marsh area through trapped waters, each method bringing the available "hatch" to the surface of the existing water level throughout the entire watered expanse. At this point, however, the divergence between the two methods begins to appear. Bringing the available "hatch" to the surface is incidental in the method employed on the Solano marshes, because the larvae so hatched are des-

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(1) F. W. Rush, "Re-flooding and Re-draining Salt Marshes for Mosquito Control, "Pro. 9th Ann. Conf. Mosq. Abt. Officials in Calif., 1938, pp. 60-62.

troyed by quickly and effectively draining them into tidal waters; it is vital in the method followed by the Matadero District, because throughout the entire dyked area the "hatch" is raised up to a point or level of vulnerability. If this level is a boating level, the "hatch" can be destroyed by spreading a single film of light oil from a flat-bottom boat.

The trapped waters are held during a time period required for the complete destruction of the larvae, once the oiling is under way. This time period is short, perhaps not over two or three days, once the oiling is complete. Where a light oil such as Diesel is used, the film disintegrates within a few hours. Although effectively killing the mosquito larvae, the oil does little injury to vegetable, fish, or game life, resulting only in a slightly burned line or fringe on the marsh vegetation after the water is drained off.

Raising the "hatch" to a point or level of vulnerability by means of flooding is the method employed by the Matadero District to abate marsh mosquitoes during the time of spring floods. The hatching of larvae through this partial storage of storm waters is favorable to farmers in the event that the dyked field is used in whole or in part for farm purposes.

Very briefly then, the method of abatement of salt marsh mosquitoes as developed in the Matadero District is a form of flood control whereby the flood waters within a dyked region are held up to a boating level during the oiling period and for a very short time thereafter, thereby enabling the spreading of a light oil by boat over the entire flooded area. This method requires vigilance at the flood gates, for the water level, once attained, should be held as constant as practicable. It must not be allowed to build up too high, in the interests of land owners; yet it should not be allowed to drop low enough so as to interfere with the free movement of the boat.

In efficiency, effectiveness, and economy, this form

of abatement of salt marsh mosquitoes within dyked fields over large areas far exceeds the old orthodox method of oiling by use of the spray can with a crew (or crews) of individual sprayers. It is flood control plus a modified form of oiling. Once the "kill" has been accomplished, the time of water subsidence is unimportant so long as it continues to subside. If it should be allowed to rise again, further hatching might occur.

A further advantage of this method of oiling through flood control over the old orthodox method of spraying with individual sprayers is found in its flexibility. By the newer method, an area confined within dykes and provided with proper gates for efficient flood control can be oiled practically as soon as first instar larvae appear. Over a large marsh area this is of great advantage, for it permits early treatment; and, as before noted, once oiled in this manner, the time for the subsidence of the waters in the flooded area is not of vital importance, and time is thus gained to reach other areas that may be in urgent need of treatment. The difficulties of transporting oil by truck over marsh areas during rainy weather periods (when much of the marsh oiling in California must be done) are also avoided, as the transporting and distributing of oil in drums is possible by boat from landings usually accessible by way of paved roads or graveled approaches.

If a boating depth of water cannot be obtained over the entire dyked area, then perhaps a water level not lower than two or three inches below the surface of the "flats" can be obtained and a spraying of the surface effected through a power sprayer unit set in a flat-bottom boat, using the available sloughs for ways of approach. There can be extended from the power sprayer unit several hundred feet of hose, mounted on a hose reel with a rotating joint, and connected up with the power-driven spray pump.

This was done very effectively by the Matadero District in the Mackay Wireless marsh during the spring of 1942. Due to installation of radio equipment, of antennae, wires, cables, etc., the Company did not permit the water level to rise to the ground level but consented to a level about three inches below the ground surface. The oiling operation was then carried out by extending several hundred feet of hose from the power sprayer unit operating in a flat-bottom boat, which traversed the various sloughs with excellent results as compared with the previous method of oiling this marsh area of approximately two hundred acres by spray can. Not only was less oil and labor required than in former years, but also the "kill" was clean, probably better than 95%. In former years, because of the difficult terrain, one could hardly say the oiling operation of the area approached 70% effectiveness.

In the above operation, although the water level was about three inches below the ground surface, the effect was the same as though it had been above, because the entire "hatch" was raised to a point or level of vulnerability, and in that state was completely eradicated.

Transportation and distribution of oil constitutes the first phase of this method of abatement. During the years of 1941 and 1942, the Matadero District has been constructing suitable loading docks at places on sloughs and borrow ditches nearest paved roadways and graveled approaches, to facilitate the trucking and transfer of oil in 50-gallon drums from oil truck to loading dock, thence by way of boat to points of distribution along the dykes (a drum to approximately every thousand feet of dyke).

The second phase is performed by boat. It consists of spreading the oil by power sprayer on the surface of the water, breaking the oil down into a fine spray which results in a film on the water that is more uniform and more rapidly spread than when the oil is merely "dumped" from the boat. Experience has taught that spraying is the better method.

In addition to establishing loading docks, the Matadero District has obtained through purchase and manufacture the following equipment:

1. HOISTING CRANE, mounted on 1½-ton truck (for launching boat, transferring oil drums from loading dock to boat, etc.)

Material for mast, boom, etc.....	$61.04 (1941)
Manufacturing and fitting to 1940 truck (1½-ton).....	168.00
Labor.....	196.50
Winches (all-steel):	
1 5-ton Ramsey (hand winch) 1937.....	77.25
1 3-ton " (hand winch) 1941.....	56.65
1 Steel pawl (reverse winding for 5-ton winch) manufacture.....	10.82
Blocks:	
4 6" sheave, tar box, wire rope snatch blocks (convertible, used either as snatch or tackle blocks)....	46.87
Cable:	
2 100-ft. lengths of 3/8" plough steel and five 5/8" clevices.....	30.78
	$647.91

2. BOAT ASSEMBLY UNIT, (for transportation and distribution of oil drums from loading dock to dykes, and transportation of power sprayer unit)

1	17' 6" flat bottom boat, beam 8' 6" manufactured of 3-ply wood.....	$ 265.74
1	Boat Bridle (steel for manuevering boat, material..... $16.04 Manufacture.. $10.00.....	26.04
1	Tripod and base boards (with leg sockets) and following attachments: a) hose lead; b) gang plank saddle; manufacture (including material)	61.42
1	Suspension sling for gang plank saddle 12 ft. of 1½" Manilla rope.....	2.64
	Splice.....	1.00
	1½" Galv. Sister-hooks and wire rope thimble	2.34
2	Chain slings (for maneuvering oil drums) one vertical and one horizontal: Material..... $9.40 Manufacture.. 13.00.....	22.40
1	Yoke (wood) to enable storage of boat in district garage through vertical lift; material..$3.32 Labor.....19.07....	22.39
		$403.97

3. POWER SPRAYER UNIT (set into boat after distribution of oil drums, for oiling operation)

1	#63 Bean Duplex Pump, connected by 1½ h.p. Cusham Husky Engine with overhead suction pipe and hose	$186.50	(1941)

1 500-ft. length of 7/16" Bean Armored Spray Hose with couplings.....$151.50

1 Barrel Frame, Hose Reel Support, Crank, and 2 Hose Reducers..... 35.20

(Bean Spray, San Jose) Tax..... 11.20

1 #1703 Hose Reel with Rotary Joint (Western Fire Equipment Co., S.F.) 38.62

$423.02

4. CHAIN BLOCK

1 1-ton "Lift-a-bout" Cahin Block (Round)..... 87.76 (1940)

5. OUTBOARD MOTORS

1 Model KA-39, 10 h.p..... 123.60 (1941

1 Model "5-40, 5 h.p..... 78.61 (1942

$202.21

6. MULTIPLE BLOCKS

a) Double

1 pair double blocks..$9.00

60 ft. of ½" Manilla rope (5 lbs. @ .27... 1.22.. $ 10.22 (1941

b) Triple

1 pair triple blocks.. 5.52

75 ft. of Seisal 5/8" rope @ .05..... 3.86.. 9.38 (1942

7. BOAT TRAILER

Steel frame, wheels, and trailer hitch.....66.95

Heavy duty springs..... 8.24

Bolts, etc..... 1.32

Lumber, 120 b.f. @ $75 per M..... 9.00

Manufacturing, welding, re-enforcement, etc.....68.50

Labor.....39.00 $193.01 (1942

$1,977.40

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Malaria Treated Effectively By Giving Less Quinine

From the New York World Telegram
January 28, 1943

Malaria-stricken soldiers can be treated just as effectively by giving less quinine over a short period of time than in the standard method. This plan is advocated by Dr. Aubrey H. Hamilton, Lieutenant Commander, USNR, who has had 20 years' experience in anti-malarial work in the war zone of southeast Asia.

Huge savings of war-scarce quinine and valuable time

of hurried physicians is foreseen in a report just issued here in collaboration with the Board of Economic Warfare and Department of Commerce.

Only about a third as much quinine would be required to complete treatment of a hundred typical cases as compared to the standard treatment. This amounts to a saving of over 50,000 grains. Treatments would require 4859 fewer days.

The hydrochloride form of quinine was most used by Dr. Hamilton and his associates. It does not upset the soldier's stomach as readily as other forms. The tablets also are not likely to harden into pellets that remain unabsorbed by the body, as occurs with quinine sulfate in tropical climates.

Quinine hooked onto hydrogen and chlorine atoms can also be taken either by mouth or injection.

"Experience in the Philippines and in Santo Domingo tends to indicate that the danger of using the intravenous route for administering quinine has been over-stated in standard textbooks", Dr. Hamilton declares.

Although preferring quinine, Dr. Hamilton also evaluates the use of other antimalarials. For cinchona bark, from which we get quinine, cannot supply all the antimalarial units needed during the war. Cinchona, or "Jesuit's Bark", obtained from South America does not contain as much quinine as that from Jap-held territory. But other components from this bark with antimalarial action can be inexpensively and efficiently extracted to augment our supply of antimalarials.

The Transmission of Plasmodium Lophurae, An Avian Malaria Parasite, By Anopheles Quadrimaculatus

By Herbert S. Hurlbut
and
Redginal Hewitt

This article is published in Public Health Reports, Volume 57, Number 50, December 11, 1942.

Science in 1942

Science
Vol. 97, No. 2507
January 15, 1943

28,585 cases of jaundice, with 62 deaths, occurred in the Army among men vaccinated with certain batches of anti-yellow fever vaccine but following a change in the method of producing the vaccine and restriction of its use to men destined for service in yellow fever endemic areas, cases of the jaundice stopped.

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Your attention is directed to Science of December 11, 1942, in which T. D. A. Cockerell, Citrus Experiment Station, Riverside, California reviews F. W. Edwards new book "Mosquitoes of the Ethiopian Region." III. Culicine adults and pupae. Mr. Cockerell says "Its 499 pages include descriptions of all the species, many illustrations, and very interesting comments on species and varieties, geographical distribution and broad topics with regard to distribution".

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In "Time" of February 1, 1943, there appeared on page 40 some very interesting comments about malaria, anti-malarial chemicals, and their use. The chemicals discussed are quinine, atabrine, plasmochin and totaquine.

PERSONAL NOTES

From Science Magazine, January 29, 1943:

Dr. William B. Herms, professor of parasitology and head of the Division of Entomology and Parasitology of the University of California, has been called to active duty by the War Department as Lieutenant-Colonel in the Sanitary Corps. He has been a Reserve Officer since 1924 and has been called for duty at the Army Medical Field Service School, Carlisle Barracks, Pennsylvania. He will be

instructor in tropical medicine, having specialized in work on malaria, typhus fever and other diseases of the tropics. Professor E. O. Essig, Professor of Entomology, will act as head of the division during Professor Herm's absence.

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Earl D. Potter, formerly with the Middlesex County (N.J.) Mosquito Extermination Commission and more recently with the U. S. Public Health Service at Columbia, S. C., was drafted and entered the U. S. Army in January, 1943. He is stationed at Camp Gordon, Augusta, Georgia.

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Capt. John W. Scott of Union County, N. J. is now stationed at Camp Phillips, Kansas.

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Major Louis Stearns, Delaware and past-president of our Association has written interesting letters from "Somewhere close to the front".

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Lieut. Robert Armstrong, Mass. is stationed at the First Service Command Laboratory, Jamaica Plain, Mass. Lieut. Armstrong has requested articles on "Experimental Work done with micronized paris green on Aedes larvae" and "Use of chloropicrin emulsion (larvicide emulsion) on mosquito larvae in general". Any information on these two topics will be welcomed by the Committee on Publication and will very likely be of help to Lieut. Armstrong.

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